

REMARKS/ARGUMENTS

Claims 1-48 are pending in the present application.

This Amendment is in response to the Office Action mailed June 26, 2007. In the Office Action, the Examiner rejected claims 9-24 under 35 U.S.C. §102(e) and claims 9-24 under 35 U.S.C. §103(a). Applicant has amended claims 9 and 17. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Rejection Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 9-24 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,833,285 issued to Ahn et al. ("Ahn"). Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a prima facie case of anticipation.

Ahn discloses a method of making a chip packaging device having an interposer. Inductors 106 are formed by deposition of a thin metallic layer after formation of a barrier layer 170 of an insulating layer 104 (Ahn, col. 7, lines 46-49). The interposer 10 and IC chips 20, 22 are arranged or flipped with solder ball leads 118 touching corresponding solder ball leads 126 on interposer 10 and IC chips 20, 22, respectively (Ahn, col. 9, lines 18-21). .

Ahn does not disclose, either expressly or inherently, at least one of: (1) a spacer between upper and lower dies in stacked dies on a package substrate to provide clearance for bond wires attaching to bond pads on the lower die; (2) a thin-film passive element integrated on the spacer; and (3) conductors attached to the passive element to connect the passive element to at least one of the upper and lower dies.

Regarding claims 9 and 17, the Examiner identifies the spacer as the interposer 10, the passive element as the inductors 106, and the conductors as the solder balls 126 (Office Action, page 3, lines 6-10). Applicant notes that element 126 is used to refer to both the storage node in the capacitors 110 (Ahn, col. 7, lines 16-19) and solder balls on surface of a chip 120 (Ahn, col. 8, lines 58-59). Since it is clear that a storage node cannot be a conductor, Applicant believes that the Examiner is referring to the solder balls on the chip 120. Applicant respectfully disagrees for the following reasons.

First, Ahn merely discloses an interposer 10 having a substrate layer 100 and an insulating layer 104 (Ahn, col. 5, lines 27-28), not a spacer to provide clearance for bond wires attaching to bond pads on the lower die. The package system 30 is formed by mounting the IC chips 20, 22 to the interposer 10 by flip-chip bonding (, col. 9, lines 15-18). Therefore, the interposer has the same size as the IC chips 20 and 22 and there are no bond pads on the lower die. Accordingly, the interposer 10 cannot provide clearance for bond wires attaching to the bond pads. To clarify this aspect of the invention, claims 9 and 17 have been amended.

Second, Ahn merely discloses inductors 106 are formed within the insulating layer 104 and on a barrier layer 70 (Ahn, Figures 1 and 2b; col. 7, lines 46-49), not integrated on the spacer. After deposition of the inductors 106, the insulating layer 104 is grown to encase the spiral inductor 106 (Ahn, Figure 2b; col. 7, lines 61-63. *Emphasis added*). Since the interposer 10 encloses the inductors, the inductors cannot be formed on the spacer.

Third, Ahn merely discloses the solder balls 126 on surface of a chip 120 (Ahn, col. 8, lines 58-59), not attached to the passive element. The solder balls 126 are outside the interposer 10 and formed on the chip. Therefore, they are not attached to the passive element.

Regarding claims 10, 16, 18, and 24, the Examiner identifies the lower and upper adhesive layers as element 122 (Office Action, page 3, lines 11-13). Applicant respectfully disagrees. Element 122 is merely an epoxy which provides for passivation and improves the fatigue characteristics of the solder joints 150 (Ahn, col. 5, lines 54-56). Passivation and fatigue improvement are not related to adhesiveness.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Vergegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989). Since the Examiner failed to show that Ahn teaches or discloses any one of the above elements, the rejection under 35 U.S.C. §102 is improper.

Therefore, Applicant believes that independent claims 9 and 24 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicant respectfully requests the rejection under 35 U.S.C. §102(e) be withdrawn.

Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 9-24 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,821,624 issued to Pasch ("Pasch") in view of Ahn. Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *MPEP* §2143, p. 2100-129 (8th Ed., Rev. 2, May 2004). Applicant respectfully submits that there is no suggestion or motivation to combine their teachings, and thus no *prima facie* case of obviousness has been established.

Furthermore, the Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated: "Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." MPEP 2141. In *KSR International Co. vs. Teleflex, Inc.*, 127 S.Ct. 1727 (2007) (Kennedy, J.), the Court explained that "[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." The Court further required that an explicit analysis for this reason must be made. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the

legal conclusion of obviousness.” *KSR 127 S.Ct.* at 1741, quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). In the instant case, Applicant respectfully submits that there are significant differences between the cited references and the claimed invention and there is no apparent reason to combine the known elements in the manner as claimed, and thus no *prima facie* case of obviousness has been established.

Pasch discloses a semiconductor device assembly technique using preformed planar structures. A programmable interposer may use embedded electronic switches because any electronic element, active or passive, may be embedded in the interposer (Pasch, col. 24, lines 34-42). An adhesive may be used to keep the substrate/interposer/ die stack under compression (Pasch, col. 25, lines 22-25). The interposers with their associated probe finger contacts may provide electrical contact with the solder bumps on a facing die (Pasch, col. 24, lines 54-56).

Ahn discloses a method of making a chip packaging device having an interposer as discussed above.

Pasch and Ahn, taken alone or in any combination, do not disclose or render obvious at least one of: (1) a spacer between upper and lower dies in stacked dies on a package substrate to provide clearance for bond wires attaching to bond pads on the lower die; (2) a thin-film passive element integrated on the spacer; and (3) conductors attached to the passive element to connect the passive element to at least one of the upper and lower dies.

Pasch merely discloses an assembly of a die 1110 to a substrate 1130 includes an interposer 1120 (Pasch, col. 20, lines 7-10), not stacked dies. Furthermore, Pasch does not disclose the stacked dies on a package substrate. Pasch merely discloses two similar-size dies being flip-chip assembled with a traced interposer disposed between them to form an assembly (Pasch, col. 23, lines 29-32). A flip-chip assembly is not stacked dies on a package substrate. Applicants note that the phrase substrate/interposer/die stack used in Pasch (Pasch, col. 25, lines 22-24) merely indicates a stack of a substrate, an interposer and a die. This is clearly different from a stack of dies on a package substrate, or stacked dies, which include a number of dies stacking on each other placed on a package substrate.

Furthermore, Pasch does not disclose a spacer between upper and lower dies in stacked dies on a package substrate to provide clearance for bond wires attaching to bond pads on the lower die.

Moreover, Pasch does not disclose or suggest a thin-film passive element. Pasch merely discloses interposer with integral probe fingers (Pasch, col. 20, lines 7-8). Probe fingers within the interposer extend into through holes (Pasch, col. 20, lines 20-31). This suggests that the interposer is not integrated on a space between lower and upper dies. Even if Pasch discloses that the interposer is thin, this does not suggest a thin-film device may be integrated on the interposer. In fact, by teaching probe fingers extend into through holes, Pasch effectively teaches away from the invention because extending into through holes would render integrating a thin-film device inefficient.

The Examiner contends that Pasch discloses a plurality of stacked dies on a package substrate, citing Figure 11b (Office Action, page 5, lines 1-2). Applicants respectfully disagree. Figure 11b merely shows the die 1110, the interposer 1120, and the substrate 1130. There is only a single die, namely the die 1110. As discussed above, the stack of die, interposer, and substrate is not the same as a stack of dies or stacked dies which include a number of dies.

As discussed above, Ahn merely discloses inductors 106 are formed within the insulating layer 104 and on a barrier layer 70 (Ahn, Figures 1 and 2b; col. 7, lines 46-49), not integrated on the spacer. After deposition of the inductors 106, the insulating layer 104 is grown to encase the spiral inductor 106 (Ahn, Figure 2b; col. 7, lines 61-63. *Emphasis added*). Since the interposer 10 encloses the inductors, the inductors cannot be formed on the spacer.

The Examiner failed to establish a prima facie case of obviousness and failed to show there is teaching, suggestion, or motivation to combine the references. When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Co., Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). “When determining the patentability of a claimed invention which combined two known elements, ‘the question is whether there is something in the prior art as a whole suggest the desirability, and thus the obviousness, of making the combination.’” In re Beattie, 974 F.2d 1309, 1312 (Fed. Cir. 1992), 24 USPQ2d 1040; Lindemann Maschinenfabrik GmbH v.

American Hoist & Derrick Co., 730 F.2d 1452, 1462, 221 USPQ (BNA) 481, 488 (Fed. Cir. 1984). To defeat patentability based on obviousness, the suggestion to make the new product having the claimed characteristics must come from the prior art, not from the hindsight knowledge of the invention. Interconnect Planning Corp. v. Feil, 744 F.2d 1132, 1143, 227 USPQ (BNA) 543, 551 (Fed. Cir. 1985). To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. In other words, the Examiner must show reasons that a skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the prior elements from the cited prior references for combination in the manner claimed. In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1996), 47 USPQ 2d (BNA) 1453. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973. (Bd.Pat.App.&Inter. 1985). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." In re Mills 916 F.2d at 682, 16 USPQ2d at 1432; In re Fritch, 972 F.2d 1260 (Fed. Cir. 1992), 23 USPQ2d 1780.

Moreover, the Examiner failed to establish the factual inquires in the three-pronged test as required by the *Graham* factual inquires. There are significant differences between the cited references and the claimed invention as discussed above. Furthermore, the Examiner has not made an explicit analysis on the apparent reason to combine the known elements in the fashion in the claimed invention. Accordingly, there is no apparent reason to combine the teachings of Pasch and Ahn.

In the present invention, the cited references do not expressly or implicitly disclose any of the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Pasch and Ahn is an obvious application of integrating passive

components on spacer ion stacked dies, or an explicit analysis on the apparent reason to combine Pasch and Ahn in the manner as claimed.

Therefore, Applicant believes that independent claims 9 and 17 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicant respectfully requests the rejection under 35 U.S.C. §103(a) be withdrawn.

Conclusion


Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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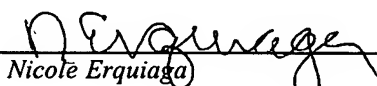
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